

A review of the genus *Mellinus*

(Hymenoptera: Sphecidae)

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Mellinus Fabricius is a small genus occurring in the Palearctic Region and in North America as far south as Guatemala. These wasps form an apparently relict group best placed in the Nyssoninae. Generalized features are the short tongue, evident notauli, simple propodeum, no omaulus, two midtibial spurs, recurrent veins widely separated at their forward ends, and a long triangular marginal cell. The principal specialization is the petiolate gaster which results in a body form somewhat like that of the philanthine genus *Trachypus*.

Morphological details useful at the specific level are few except for size and color. Helpful are clypeal shape, male antennal form, petiole shape, tibial setation, and male genitalia.

Studies of male genitalia have revealed dramatic differences among several species (figs. 13–16) and strong similarities among others. In *abdominalis*, a peculiarity is a dorsal arm of the digitus which opposes a fingerlike extension from the enlarged gonostyle (fig. 15). The three species of the *rufinodus* group, *rufinodus*, *bimaculatus* and *imperialis*, have nearly identical genitalia. In these, the two branches of the aedeagus are loosely connected by membrane which seems capable of great expansion (fig. 16). Also unusual in the *rufinodus* group are the overlapping distal lobes of the gonostyle.

In palearctic species, ground nests are stocked with flies, especially Muscoidea. Since *arvensis* is rather common, it has been observed frequently in the act of pouncing like a cat on flies attracted to fresh cow droppings. Huber (1961) has presented a detailed exposition of known biology.

We are treating *Mellinus* as including 10 species of which three are palearctic. One of the seven New World forms is described as new. Several of the species are rare in collections. We have seen no material of *obscurus*, and females only of *alpestris* and *satanicus*. Since markings are diagnostic for known species, males of the last two should be readily recognized when found.

Material has been borrowed from several institutions, but we are especially grateful to curators at the U.S. National Museum, Cornell University, American Museum of Natural History, California Academy of Sciences, and Canadian National Collection.

KEY TO SPECIES OF MELLINUS

1. Propodeum generally rugose posteriorly, enclosure medially ridged and sculptured but with a smooth outer area (fig. 4), palearctic 2
Propodeum weakly sculptured posteriorly except toward abdominal insertion, enclosure evenly shagreened (fig. 5), New World 4
2. Tergal markings yellow *arvensis* (L.)
Tergal markings whitish, female legs reddish 3
3. Tergum V banded, scutellum with a whitish spot *crabronea* Thunb.
Tergum V all dark, scutellum all dark *obscurus* Handl.
4. Abdomen all dark 5
Abdomen with pale markings 6
5. Female clypeus without a median discal projection, scutellum lightly shagreened and somewhat polished between punctures, pronotal ridge yellow, female flagellomere I about 2.5 times as long as broad (fig. 8) - *pygmaeus* Handl.
Female clypeus with median discal projection (figs. 3, 6), scutellum closely shagreened and dull between punctures, pronotum all dark, female flagellomere I about 2.8 times as long as broad (fig. 7) - *satanicus* Siri and Bohart
6. Tergum III with a complete pale band or with closely approximated pale spots 7
Tergum III at most with widely separated pale spots 8
7. Petiole and legs largely red, both scutellum and metanotum with pale spots, terminal flagellomeres about half yellow and half black, tergum IV usually with pale spots *rufinodus* Cr.
Petiole and legs largely brown, both scutellum and metanotum dark, terminal flagellomeres dark, tergum IV banded *imperialis* Bohart
8. One or more abdominal segments beyond petiole red, male flagellomeres X-XI distinctly enlarged and black (fig. 9), median lobe of male clypeus protruding and truncate (fig. 1) *abdominalis* Cr.
No abdominal segments beyond petiole red, no asymmetry or enlargement of male flagellomeres, male clypeus flat and with a tridentate apex or at least one distinct median tooth 9
9. Flagellomeres dark, femora and tibiae black, tarsi brown with some yellow, petiole black with yellow markings *alpestris* Cam.
Flagellomeres dark dorsally but yellow ventrally, femora and tibiae light red or yellow, petiole dark red to light red *bimaculatus* Pack.

MELLINUS ABDOMINALIS Cresson

(Figs. 1, 9, 15)

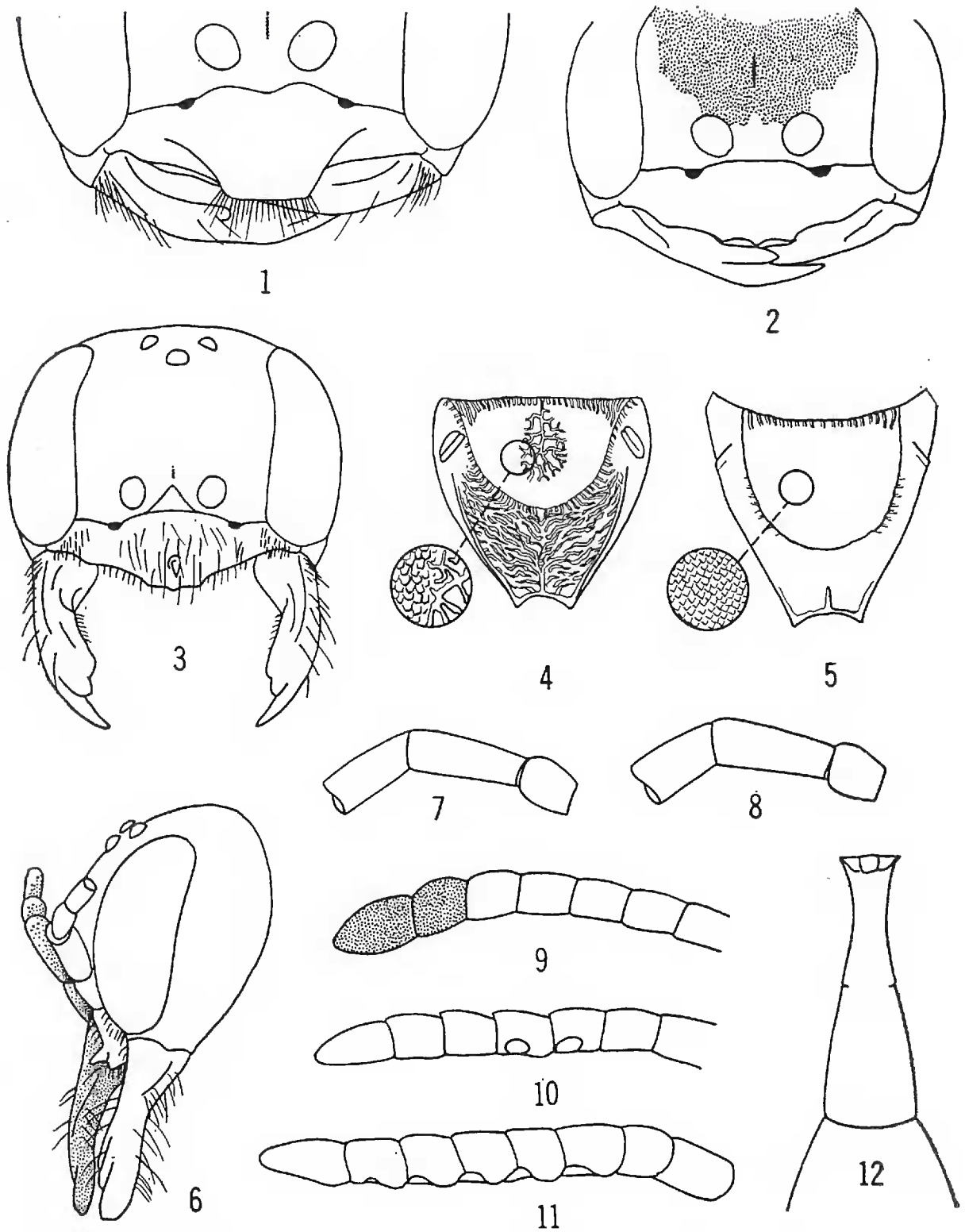
Mellinus abdominalis Cresson, 1882. Trans. Amer. Entomol. Soc., Proc. 9:xxxix.

Lectotype ♀, Montana (Acad. Nat. Sci. Philadelphia).

Mellinus abdominalis personatus W. Fox, 1894. Entomol. News 5:202. Holotype

♀, Montana (Acad. Nat. Sci. Philadelphia).

This is the most distinctive species of *Mellinus*. It is the only one in which the abdomen is mostly or all red with pale markings reduced



FIGS. 1-12. Fig. 1. *Mellinus abdominalis*, male face. Fig. 2. *M. rufinodus* female face, showing color pattern. Fig. 3. *M. satanicus*, female face. Figs. 4-5. Propodeum and enlarged detail. Fig. 4, *arvensis*. Fig. 5, *satanicus*. Fig. 6. *M. satanicus* head, lateral. Figs. 7-8. Pedicel and flagellomeres I-II. Fig. 7, *satanicus* female. Fig. 8, *pygmaeus* female. Figs. 9-11, *crabronea*. Fig. 12, *M. satanicus*, petiole and base of abdominal segment II.

or absent. The male is especially odd with respect to the slender and gradually expanded abdomen, sculptured clypeal form (fig. 1), specialized antenna (fig. 7), prominent hair tuft on last two visible sterna, and complex genitalia (fig. 15).

We have seen 19 specimens all from localities west of the 100th meridian as follows: Montana: Platte Co.; Wyoming: Carbon Co.; Nebraska: Valentine, Thedford, Alliance, Halsey; Colorado: Mesa Verde, Great Sand Dunes.

MELLINUS ALPESTRIS Cameron

Mellinus alpestris Cameron, 1890. Biol. Centr.-Amer. Hymen. 2:85. Holotype ♀, Xucumanatlan, Guerrero, Mexico (Brit. Mus. Nat. Hist. London).

We have seen females only, 11 specimens in all, including the holotype. Morphologically, *alpestris* and *bimaculatus* are quite similar and must be separated by color characters as given in the key. All of our specimens have a pair of yellow spots on the propodeal enclosure, contrary to the case in *bimaculatus*. Also, our *alpestris* have the clypeus all yellow but this character is known to be variable in other species.

Collections are from Mexican States as follows: Michoacan: El Pueblito; Guerrero: Xucumanatlan; Mexico: Texcoco; Morelos: Cuernavaca, Amecameca.

MELLINUS ARVENSIS (Linnaeus)

(Figs. 4, 13)

Vespa arvensis Linnaeus, 1758. Syst. Nat. Ed. 10:573. Holotype ♀, "Europa," Linnaean Coll., London.

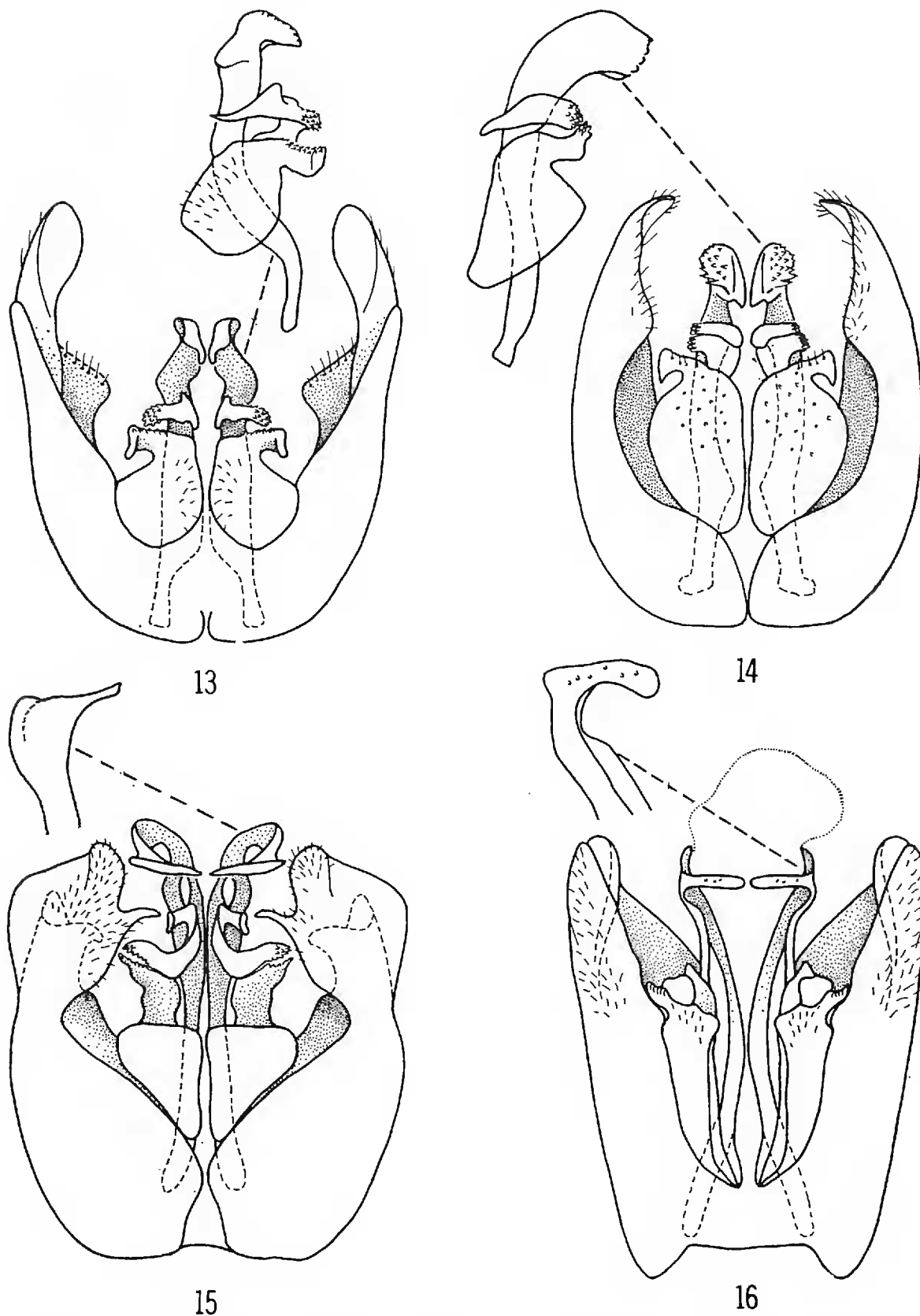
The complicated synonymy is not given here; see Bohart and Menke (in press).

We have studied 52 specimens of *arvensis*. In determining species limits, reliance has been placed on the discussions given by Handlirsch (1888) and Beaumont (1964). This is the largest species of *Mellinus*, surpassing *rufinodus* on the average. Some females attain a length of 15 mm. The propodeal sculpture is characteristic of European *Mellinus* as shown in fig. 4. Genitalia are depicted in fig. 15. The species is widespread in Europe and is sometimes abundant in mountainous areas. Specimens from the Alps tend to have the legs somewhat reddish, especially in females.

MELLINUS BIMACULATUS Packard

Mellinus bimaculatus Packard, 1867. Proc. Entomol. Soc. Philad. 6:419. Syntype ♀, Dublin, New Hampshire (Mus. Comp. Zool. Harvard); syntype ♀, Brunswick, Maine (location of type unknown).

Mellinus wolcotti H. S. Smith, 1908. Entomol. News 19:299. Holotype ♀, Beaver Island, Michigan (Univ. Nebraska).



FIGS. 13-16. Male genitalia, ventral, and enlargement from aedeagal area. Fig. 13, *arvensis*. Fig. 14, *pygmaeus*. Fig. 15, *abdominalis*. Fig. 16, *imperialis*.

We have seen 18 specimens. The face may be nearly all black as in Packard's syntypes, variously mottled, or mostly yellow as in Smith's *wolcotti*. The species is similar to *alpestris* but differs in markings as indicated in the key. The petiole is ordinarily black but occasionally

may be dull red and rarely is yellow blotched. *M. bimaculatus* average a little smaller than *rufinodus*, 8–9 mm long rather than 9–12 mm. The male genitalia are similar to those of *rufinodus* but the distal lobes of the gonostyle are somewhat more slender and tapering.

This is the only species known to occur in eastern United States. However, it ranges into Mexico. Localities are: Maine: Brunswick; New Hampshire: Dublin, Franconia; Massachusetts; New York: Huntington, New Jersey; Ohio: Stark Co.; Michigan: Clare Co., Midland Co., Beaver Island, Douglas Lake. In Mexico it has been collected in Jalisco: La Primavera; and Oaxaca: Macuilxochitl.

MELLINUS CRABRONEA (Thunberg)

(Fig. 11)

Crabo sabulosus Fabricius, 1787, nec *Sphex sabulosus* Linnaeus, 1758, now in *Ammophila*. Lectotype ♀, Copenhagen, Denmark (Univ. Copenhagen Zool. Mus.).

Sphex crabronea Thunberg, 1791, new name for *Crabo sabulosus* Fabricius (Art. 59c, ICZN).

We have seen only 10 specimens of *crabronea* and key characters have been based on discussions (under *sabulosus*) by Handlirsch (1888) and Beaumont (1964). The subserrate form of the male antenna is shown in fig. 11. The serrations seem to be a little more pronounced than in *arvensis* but it must be said that the two species are structurally almost identical. Separation on the basis of the white markings in *crabronea* is not entirely satisfactory, particularly in males. Recorded localities are in Europe and central Asia.

MELLINUS IMPERALIS R. Bohart

(Fig. 16)

Mellinus imperialis Bohart, 1968. Pan-Pac. Entomol. 44:235. Holotype ♂, Bard, California (Univ. California, Davis).

The brown and extensively deep yellow color pattern distinguishes this species from *rufinodus*. However, in the absence of structural differences there remains the possibility that it is an early season (February to April) Sonoran desert subspecies of *rufinodus* (June to September). We have seen a total of 11 specimens: California: Bard; Sonora (Mexico): Guaymas, Cocorit, Alamos.

MELLINUS OBSCURUS Handlirsch

Mellinus obscurus Handlirsch, 1888. Sitz. Akad. Wiss. Wien 96:288. Holotype ♀, Korea (Radoszkowsky Coll., Warsaw).

Mellinus tristis Pérez, 1905. Bull. Mus. Paris 1905:156. Holotype ♀, Japan, "Japan central" (Nat. Hist. Mus. Paris).

Since we have seen no specimens of *obscurus*, reliance has been placed on the original descriptions referred to above. The possibility exists that *obscurus* is a dark variety or subspecies of *crabronea* from eastern Asia.

MELLINUS RUFINODUS Cresson

(Fig. 2)

Mellinus rufinodus Cresson, 1865. Proc. Entomol. Soc. Philad. 4:475. Lectotype ♀, Colorado (Acad. Nat. Sci., Philadelphia).

The mostly red legs and petiole are a fairly constant color character but the femora may be all dark. As in other *Mellinus*, facial markings are variable. Some *rufinodus* have the face mostly yellow (fig. 2), others mostly black. We have seen two specimens with a yellow band on tergum IV as in *imperialis*, but the more extensively pale underside of the flagellum in the former species is distinctive.

We have seen 83 specimens. All United States material has been from west of the 100th meridian. Nebraska: Thedford; Texas: Valentine; Colorado: Denver, Dumont, Poudre Canyon; New Mexico: Pecos, Organ Mts., Raton; "Montana"; Utah: Box Elder Co., Farmington, Provo; Arizona: Chiricahua Mts., Huachuca Mts., Santa Rita Mts. Mexican localities by States are: Chihuahua: Arroyo Mestino, 7600 ft.; Durango: 10 mi. w. Durango; Guerrero: 40 mi. n. Queretaro; Mexico: Teotihuacan; Aguascalientes: Penvelos.

MELLINUS PYGMAEUS Cameron

(Figs. 8, 10, 14)

Mellinus pygmaeus Handlirsch, 1888. Sitz. Akad. Wiss. Wien 96:289. Syntypes, 1 ♂, 2 ♀, Orizaba, Mexico (Nat. Hist. Mus. Vienna).

This small dark species is similar to *satanicus* but smaller, about 7 mm long instead of 12.5, and more polished, especially on terga I-II. The female antenna is perceptibly more clubbed in *pygmaeus* and a pair of yellow spots are nearly always present on the pronotal ridge. The clypeus is flat and may be black or with considerable yellow. Genitalia (fig. 14) are distinctive among known forms. The gonostyle is relatively simple and the aedeagus bears stout spines.

We have seen 20 specimens, one from Panajachel, Guatemala and the others from Mexico: Michoacan: Puerta Garnica; Veracruz: Coscomatepec, Orizaba (holotype); México: Texcoco; Puebla; Cuetzalán; Morelos: Amecameca. Cuernavaca; Chiapas: San Cristobal. Handlirsch (1888) reported a pair of *pygmaeus* in the Dresden Museum (now destroyed) from "Brasilien." The occurrence of the species in South America needs confirmation.

Mellinus satanicus, new species

(Figs. 3, 5, 6, 7, 12)

Female: Length 12.5 mm. Black with yellow in narrow spots along inner orbit, scape in front, faint lateral dots on clypeus, and most of foretibia anteriorly; wings lightly stained. Pubescence pale fulvous, moderate, short but erect and thick beneath thorax as well as under trochanters and femora. Body closely microsculptured in a reticulate pattern, scutum posteriorly with short and fine longitudinal ridging, mesopleuron and scutellum with minute punctures scattered over microsculpture. Face (figs. 3, 6) with a sharp, compressed, hornlike, median, projection at lower one third of disc; antenna slender, flagellomere I about 2.8 times as long as broad (fig. 7); propodeum finely sculptured (fig. 5); petiole 4.0 times longer than broad, one third as broad as tergum II (fig. 12). Outer margin of hindtibia with numerous relatively long spines set on low protuberances.

Holotype female, ZONTEHUITZ NEAR SAN CRISTOBAL, CHIAPAS, MEXICO, 9600 ft., June 25, 1969 (W. R. M. Mason, Canadian National Collection, Ottawa).

The peculiar horned clypeus (figs. 3, 6) separates the species immediately. In addition, the extreme reduction of yellow is remarkable. This should lead to recognition of the male when it is discovered.

REFERENCES CITED

- BEAUMONT, J. DE. 1964. *Insecta Helvetica fauna* 3. Hymenoptera: Sphecidae. 169 pp. Soc. Entomol. Suisse, Lausanne.
- BOHART, R. M. AND A. S. MENKE (in press). Sphecid wasps, a generic revision, U. C. Press, Berkeley.
- DALLA TORRE, C. G. DE. 1897. *Catalogus Hymenopterorum, etc.*, vol. 8. Fossores. viii + 749 pp. G. Engelmann, Lipsiae.
- FOX, W. J. 1894. Studies among the fossorial Hymenoptera. III. Synopsis of the N. Am. species of the genus *Mellinus* Fab. *Entomol. News*, 5: 201-203.
- HANLIRSCH, A. 1888. Monographie der mit *Nysson* und *Bembex* verwandten Grabwespen. *Sitz. Akad. Wiss. Wien. Math.-Nat. Classe*, 96: 219-311.
- HUBER, A. 1961. Zur biologie von *Mellinus arvensis*. *Zool. Jahrb. Abt. Syst. Oekol. Geol. Tiere*, 89: 43-118.